Practitioner's Docket No.: 791_147 ***PATENT***

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Masahiro KIDA

Ser. No.: 09/863,680 Group Art Unit: 1742

Filed: May 23, 2001 Examiner: Jenkins, D.

Confirmation No.: 1276

For: PROCESS FOR PRODUCTION OF INTERMETALLIC COMPOUND-BASED COMPOSITE MATERIAL

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on *May 6, 2003* at (703) 872-9311.

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REQUEST FOR RECONSIDERATION

Sir:

The following remarks are in response to the Final Office Action mailed January 14, 2003. Claims 1-18 are pending herein.

Examiner Jenkins is thanked for courtesies extended to Applicant's representatives during a telephone interview on April 30, 2003. The substance of that interview has been incorporated into the following remarks.

Claims 1-18 were rejected under §103(a) over Newkirk et al. This rejection is respectfully traversed.

Pending independent claim 1 recites a process in which an intermetallic compound-based composite material is produced. The composite material has a reinforcing material and an intermetallic compound. The reinforcing material (e.g., Al_2O_3, AlN, SiC, Si_3N_4) is mixed with a metal powder (e.g., Ti, Ni, Nb) and then impregnated with an Al melt. The metal

powder reacts with the molten Al and is converted into an aluminide intermetallic compound. It is preferred that all of the Al is converted to the intermetallic compound, but up to 30 mass percent may remain in the final composite material. Accordingly, the final composite material includes the reinforcing material, the intermetallic compound and up to 30 mass percent Al.

The claimed mass ratio of 0:10 to 3:7 means that the intermetallic compound makes up at least 70% of the total of the combined intermetallic and metal phases (hereinafter "the metal matrix"). While Al can remain in the metal matrix in an amount of up to 30%, it is preferable that all of the Al be converted into the intermetallic compound upon reacting with the metal powder mixed with the reinforcing material.

Pending independent claim 13 recites a similar process except that an oxide powder (which is reducible by Al) is added to the components making up the mixed powder.

Controlling the mass ratio of residual Al to the intermetallic compound in the matrix (as claimed) provides several benefits, which include: a composite material having sufficient mechanical strength near the melting point of aluminum; a composite material having thermal resistance without showing a corresponding reduction in mechanical strength; and a composite material having increased fracture resistance characteristics due to a ductile phase (see paragraph [0037] of the present specification). Applicants respectfully submit that Newkirk, discussed below, does not disclose or suggest that the intermetallic compound should be at least 70% of the metal matrix post impregnation with the molten Al, as claimed.

Newkirk deals with a process of modifying the properties of a metal matrix included in a composite structure. A reinforcing material (e.g., Al_2O_3), which can be mixed with a metal powder (e.g., Ni, Cu or Mg), is infiltrated with a matrix metal (e.g., Al or Al alloy). However, contrary to the metal matrix obtained from the composite forming process of the

claimed invention, Newkirk's final composite structure (i.e., after the matrix metal infiltration step) includes a metal matrix that is predominantly made up of Al. This is shown most clearly in Fig. 4 of Newkirk, which will be discussed below.

Fig. 4 of Newkirk shows an electron microscope image of the final composite structure and provides the only disclosure in Newkirk by which to assess quantitatively the amount of Al compared to the amount of intermetallic compound in the metal matrix after the infiltration of the molten matrix metal. As is shown in Fig. 4, the final composite structure includes a ceramic phase (i.e., Al_2O_3 particles 52 shown in the dark areas), a metal phase (i.e., Al or Al alloy 54 shown in the grey areas) and an intermetallics phase (Al-Cu intermetallic compound 53 shown in the white areas).

Fig. 4 of Newkirk clearly illustrates that Al-Cu intermetallic compound 53 is not even close to being at least 70% of the metal matrix. Nor would skilled artisans, based on Fig. 4 and the rest of Newkirk's disclosure, be led to reasonably believe that any benefits would arise out of controlling the intermetallics phase to be at least 70% of the final reaction product, let alone the benefits discussed above. Indeed, Newkirk clearly teaches the opposite of the claimed invention, which is that the metal matrix (post matrix metal infiltration step) should include a large amount of metal phase 54 relative to the amount of intermetallics phase 53.

Figs. 5a-5d of Newkirk show electron microscope pictures of samples A-D listed in Table 1 (see cols. 35 and 36 of Newkirk). The composite structures of samples A-D are formed by infiltrating an Al_2O_3 filler material with an Al-based matrix metal (e.g., Al or Al alloy). In these samples there is no metal powder that is mixed with the Al_2O_3 filler material prior to being infiltrated with the molten matrix metal. As such, the composite structures shown in Figs. 5a-5d include only a ceramic phase (dark areas) and a metal phase (white

areas), but do not have an intermetallics phase dispersed therein, as claimed. Instead, the intermetallics phase is subsequently formed using a separate heat treatment step after the composite structure is formed (i.e., post infiltration with the molten matrix metal).

During the above-mentioned telephonic interview, Examiner Jenkins pointed to column 13, lines 40-50 and column 14, lines 22-29 and contended that Newkirk teaches that the metal matrix in the final composite structure can be formed entirely from intermetallics. Applicant respectfully disagrees.

With respect to column 13, lines 44-50 of Newkirk, it is stated that "when a specified metal is mentioned as the matrix metal, it should be understood that such matrix metal includes that metal as an essentially pure metal, a commercially available metal having impurities and/or alloying constituents therein, an intermetallic compound or an alloy in which that metal is the major or predominant constituent." Applicant interprets Newkirk's laundry list of metals that can allegedly be used as the matrix metal to mean that when a specified metal (Al, for example) is identified as the matrix metal, that metal can be included (rather than excluded) in the form of an intermetallic compound. In other words, in an infringement context, for example, *an intermetallic compound is not necessarily excluded from being used as the matrix metal.* This is nothing more than an attorney's unreasonable attempt at providing the broadest possible protection for Newkirk's claimed invention in an infringement context. By no means is this an enabling disclosure of how to make a composite material having at least 70% intermetallic compound in the matrix, as in the present invention.

Assuming that Newkirk's matrix metal reacts with another metal mixed with the filler material upon infiltration (as claimed), there is no disclosure or suggestion that all of Newkirk's matrix metal would be converted into intermetallics. For example, Newkirk

clearly discloses that "such matrix metal ***includes*** (emphasis added) that metal as... an intermetallic compound" (see column 13, lines 46-49). Accordingly, Newkirk does not disclose that the final metal matrix (as opposed to the matrix metal itself) is formed entirely of an intermetallic compound after the matrix metal infiltrates the filler material, but rather, discloses that the matrix can include intermetallic compound in some unspecified percentage.

Moreover, there is no disclosure in Newkirk of how one skilled in the art would make a composite structure including a metal matrix that includes 100% intermetallics phase, especially in light of Newkirk's Fig. 4 (discussed above) and Newkirk's Examples. Again, Fig. 4 strongly contradicts the PTO's position that Newkirk's matrix is at least 70% intermetallic compound.

With respect to column 14, lines 22-29 of Newkirk, it is stated that a reaction product (e.g., the metal matrix) "should also be understood as *including intermetallic compounds* (emphasis added) which form as a result of the above-described reaction(s)." As should be clear from the above discussion, Newkirk merely discloses that the final metal matrix product (e.g., the matrix metal phase and the intermetallics phase) can *include* intermetallic compounds. This does not, however, disclose or suggest that the mass ratio of intermetallics in the metal matrix is or should be controlled to be within any range relative to the infiltrated molten matrix metal, let alone that at least 70% of the infiltrated molten matrix metal is converted into an intermetallic compound, as claimed.

In view of all of the foregoing, reconsideration and withdrawal of the rejection of claims 1-18 under §103(a) over Newkirk et al. are respectfully requested.

If Examiner Jenkins believes that further contact with Applicant's attorney would be advantageous toward the disposition of this case, he is herein requested to call Applicant's attorney at the phone number noted below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-1446.

Respectfully submitted,

May 6, 2003
Date

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